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Design and Development of A Mikrocontroller Lawn Car Based on Android Smartphone

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ABSTRACT

At present, the grass contains wild plants that can damage the surrounding plants. Therefore, the idea came up to design microcontroller-based lawnmowers with Android smartphones. What is certain, if the blade of the grass cutter uses a thin, hard and very sharp knife, so that the grass can be easily cut. The use of this lawn mower is controlled with an Android smartphone from the specified distance to facilitate the work of mowing grass. Android smartphone with a car connected via Bluetooth, which is included in the car via the Bluetooth module HC-05. The user manuals of the Android smartphone are sent to the microcontroller of the vehicle to be processed into a vehicle driver. The results obtained by testing this system may move across the screen of an Android smartphone in accordance with the user control.

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1. INTRODUCTION

For all, grass is a disturbing plant in the home garden. Grass is a plant with roots that grow and clump together. Grass is a plant that can grow wild in almost all open or protected areas, both tropical and subtropical. Grass can grow in clumps or individually. However, as technology advances, grass can be picked or tidied more easily because there are more practical tools, such as car washers, that can be remotely controlled with an Android smartphone. This car makes your hands-free job of mowing grass easier. The results are also satisfactory if you use tools that are still manual.

Grasses are exceedingly advantageous to nature and to mankind. It gives nourishment, fuel, pharmaceutical, protect and transportation. It gives security against soil disintegration and makes strides discuss quality and channel contamination. Whereas grasses progress both human and creature life it can moreover be a bug, intrusive and bringer of passing and annihilation. Intrusive grass species when dried can cause fire. A few grass species can murder plants by choking and uprooting them and competing to the soil supplements and water resources. The obtrusive and wild nature of a few species of grasses can incredibly affect the environment and the economy [1].

In this study we focused to used the ATMega328, HC-05 sensor and Android smartphone. With the design of this tool, it will help the community to easily manual labour which can be found in which this study was focused on.

2. RESEARCH METHOD

In this study we used literature study conducted to broaden the author's knowledge and to seek reference material by reading literature and theoretical materials in the form of books and data from the microcontroller, ATMega328 and android smartphone [2]. Development stage by create a microcontroller-based turf design with an Android smartphone. Analysis Phase by during testing, data is retrieved from various hardware and software parts to see if they work as intended. In addition, tests are used to determine the results and functionality of the system [2], [3].

Microcontrollers are chips that can act as electronic circuit control and generally store programs therein. Microcontrollers typically consist of central processing unit (CPU), memory, dedicated I / O, and supporting devices such as analog-to-digital converters (ADCs) that are already integrated into them. Can be seen in Figure 1.

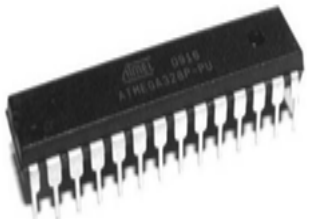

Figure 1. Microcontroller [4]

Aurduino is an electronic circuit that is open source and whose hardware and software are easy to use. Aurduino is a microcontroller card based on ATMega328. Aurduino has 14 input / output pins, of which 6 can be used as PWM outputs, 6 analog inputs, 16 MHz crystal oscillators, USB ports, power connectors, ICSP heads and reset buttons. Can be seen in Figure 2.

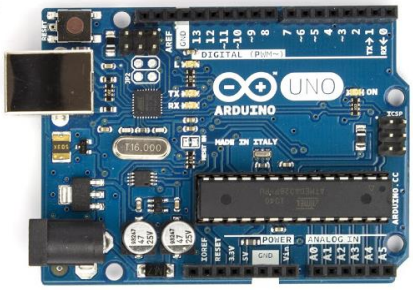

Figure 2. Arduino Uno [5]

The servo motor is a device or a rotary drive (motor) equipped with a servo loop so that it can be set up or adjusted to determine and determine the angular position of the motor output shaft position. The servo motor is a device consisting of a DC motor, a series of gears, a control circuit and a potentiometer. A series of gears attached to the DC motor shaft slows the shaft rotation and increases the torque of the servo motor, while the potentiometer with the resistance change with the motor rotating serves as a determinant for the rotational position of the servo motor shaft. Relay is a switch that is electrically operated and is an electromechanical (electromechanical) component consisting of two main parts, namely solenoid (coil) and mechanism (a set of contact switches / switches). Relays use the electromagnetic principle to move the contact switch so that electricity can be conducted at a higher voltage with a small electrical current (low power). Dinamo is an electric motor or a power plant. A tool to convert kinetic energy into electricity. When the dynamo generates alternating current, it is often referred to as a generator. In the dynamo, the coil is in a room that is filled with homogeneous magnets. As the coil rotates, the magnetic flux that penetrates the coil changes every time.

Bluetooth HC-05 is a wireless communication protocol that operates at a 2.4 GHz radio frequency for data exchange on mobile devices such as PDAs, leptops, cell phones and others. An example of the results of the most widely used Bluetooth Bluetooth Type HC-05. Bluetooth HC-05 is one of the Bluetooth devices that are available in the market at a relatively low price. Bluetooth HC-05 consists of 6 pins, each with a different function (see Figure 3).

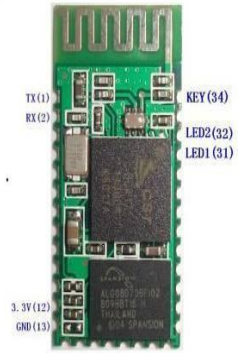

Figure 3. Bluetooth HC-05 [6]

A battery is a device that contains an electrical cell that stores energy that can be converted into energy. Batteries produce electricity through chemical processes. A battery or a rechargeable battery is an electrical cell in which a highly efficient reversible electrochemical process takes place. devices with high mobility or smartphones. Android is open source or open source for developers to build their own applications for public use. This operating system allows developers to code using the Java programming language, but does not support the native code programming language. Android relies on Linux with version 2.6 for source service systems such as security, memory management, process management, network stacks, and driver models. The kernel also acts as an abstract layer between hardware and all software. Developers have full access to the API framework used by the core application. The application architecture should simplify the reuse of components. The same mechanism with which components can be exchanged. The Android operating system supports sharing of connectivity such as GSM, CDMA, EDGE, Bluetooth 3G and WiFi. Sharing this support will further enhance the performance of Android-based smartphones.

Consists of a series of activities that describe in detail how the system is executed and design the details and details of the system to be created so that the system meets the requirements specified in the system analysis phase. Before designing the hardware and software, you must create a system block diagram. The design of this system aims to find out the data source, the data process, and the output being executed by the system. The components needed to create the system diagram are Arduino Uno, relays, servomotor. Block diagram of grass-based car design. A microcontroller with an Android smartphone is shown in Figure The block diagram system design in figure 4.

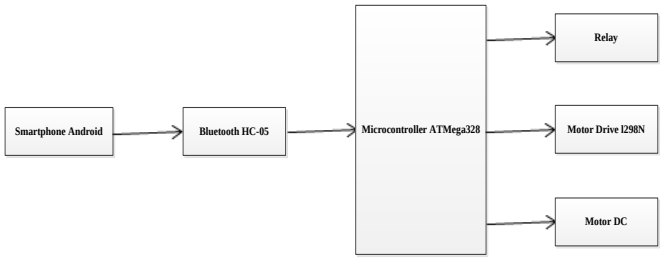

Figure 4. Block Diagram The Lawn Car Design on a Microcontroller Base With an Android Smartphone

Flowchart is a diagram of specific symbols that describe the sequence of processes in detail and the relationship between a process and other processes in a program. Flowchart in Figure 5.

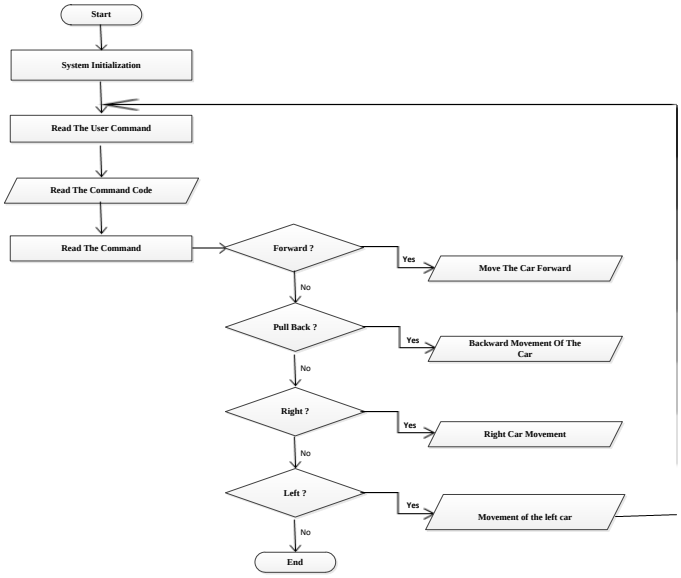

Figure 5. Flowchart

3. RESULTS AND DISCUSSION

HC-05 sensors require a voltage of 5 volts, with the RXD HC-05 sensor connected to pin 3 of Arduino, while the TXP pin HC-05 sensor is connected to pin 4 of Arduino. For the grounded ground pin and for the pcc pin, the pin is connected to Arduino at 5 volts to produce the required voltage at the HC-05 sensor. The connection of the Arduino to the HC-05 Bluetooth sensor is shown in Figure 6.

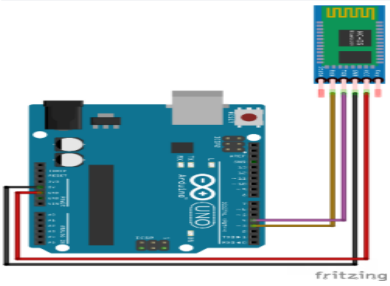

Figure 6. Module Bluetooth HC-05

The drive motor L298N is used to drive a lawnmower wagon. The L298N drive motor controls the DC motor, with the pin in 1 on the drive connected to Pin 9 Arduino, pin in 2 on the drive connected to pin 8 Arduino, pin in 3 on the drive connected to pin 7 Arduino, pin in 4 am Drive connected to pin 6 Arduino. Then the right DC motor is connected to Pin Out 1 and Out 2 and the left DC motor to Pin Out 3 and Out 4. In order for the L298N motor drive to move the DC motor, we provide a voltage of 12 volts from the battery, which is connected to the ground pin and 12 volt pin. Drive and DC motor are shown in Figure 7 on theL298N.

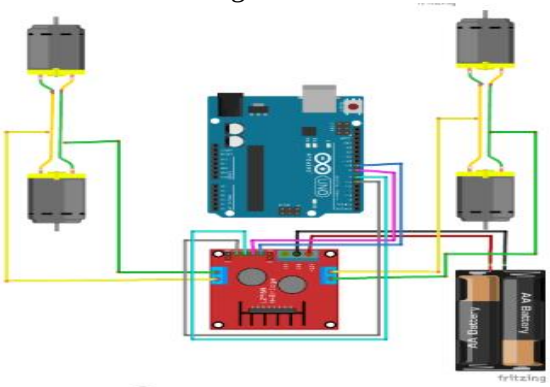

Figure 7. Design of the vehicle control system

To design a lawnmower system, a DC motor component and a relay connected to Arduino are required, the relay being an electric current controlled switch to control the DC motor. The grounding module relay contact pin is connected to the Arduino ground contact pin. The relay contact pin of the PCC module is connected to the PCC contact pin. And the pin in 1 relay module is connected to pin 5 Arduino. The relationship of the module to the relay module is shown in Figure 8.

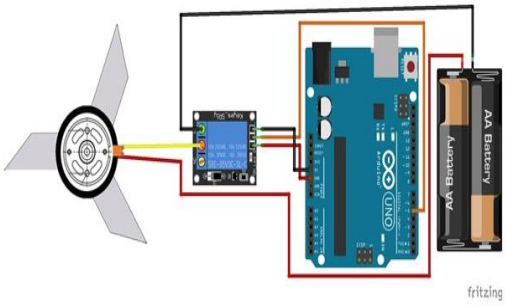

Figure 8. Design of grass cutting systems

To better understand how the entire tool works, there must be a full range of tools available. Figure 9 shows a full range of microcontroller-based lawnmowers.

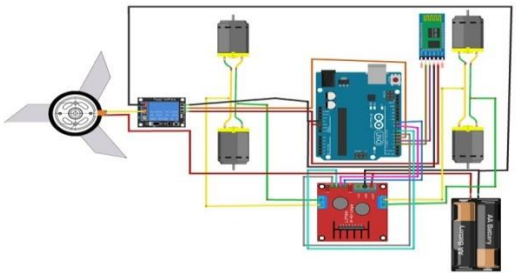

Figure 9. Minimum Circuit of the ATMega328 Microcontroller System

In the above complete circuit, obtained from the HC-05 sensor sent by Android, this is handled by Arduino when the HC-05 sensor receives inputs from Android according to the program settings and the microcontroller receives from the HC-05 Sensor received data processed. In the above table, various connectivity tests were performed between Bluetooth and Android smartphones. In the above table, there are two conditions, namely, conditions without obstacles in which the state does not disturb, or there are obstacles and conditions with obstacles in which there are obstacles or obstacles between the car with an Android smartphone. However, both states have no effect, the status of God remains connected or connected and the state of the car can be on or off. Removing the car with an Android smartphone> = 11 meters, more than 11 meters, the car is not connected to an Android smartphone or disconnected.

Table 1. Testing the Bluetooth connection with an Android Smartphone.

Number	Meter	Unhindered Conditions		Condition of the car	Conditions with disabilities		Condition of the car
		Bluetooth status	Time		Bluetooth status	Time	
1	1	connected	1,56	Car on / off	connected	2,97	Car on / off
2	2	connected	3,28	Car on / off	connected	4,03	Car on / off
3	3	connected	5,41	Car on / off	connected	6,03	Car on / off
4	4	connected	6,72	Car on / off	connected	7,72	Car on / off
5	5	connected	8,07	Car on / off	connected	10,34	Car on / off
6	6	connected	9,38	Car on / off	connected	12,13	Car on / off
7	7	connected	10,18	Car on / off	connected	13,35	Car on / off
8	8	connected	11,37	Car on / off	connected	15,04	Car on / off
9	9	connected	12,62	Car on / off	connected		
10	10	connected	14,31	Car on / off	connected		
11	11	11 Meters or More no Connection					

4. CONCLUSION

Based on the design and testing, with this microcontroller-based lawnmower, you can work comfortably and become more practical and efficient. The microcontroller-based lawnmower design system with an Android smartphone has been successfully assembled. The ATMega328 microcontroller is used as a tool to process data from a system used to send and control vehicles from an Android smartphone.

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